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Conformational Transmission in DNA

M. H. P. van Genderen^a; L. H. Koole^a; H. M. Buck^a

^a Department of Organic Chemistry, Eindhoven University of Technology, Eindhoven, The Netherlands

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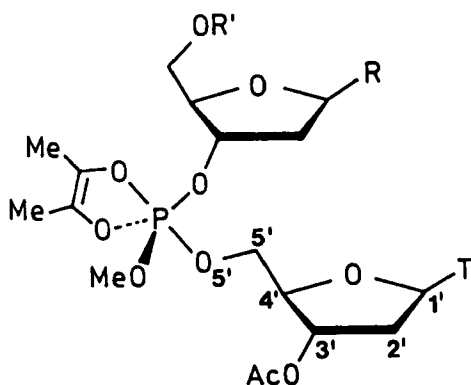
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CONFORMATIONAL TRANSMISSION IN DNA

M.H.P. VAN GENDEREN, L.H. KOOLE, and H.M. BUCK
 Department of Organic Chemistry, Eindhoven University
 of Technology, P.O. Box 513, 5600 MB Eindhoven,
 The Netherlands

This poster presents our recent results on DNA dimers in which a stable trigonal bipyramidal pentacoordinated phosphorus (P^V) structure forms the internucleoside linkage. Conformational analysis of the systems 1-4 with 300 and 500 1H NMR has shown that the P^V structure results in a distorted conformation of the backbone structure (1).



- 1: R = T, R' = Ac
- 2: R = T, R' = CPh₃
- 3: R = H, R' = Ac
- 4: R = H, R' = CPh₃

The preferred conformation changes from g^+ (O_5' located above the 2'-deoxyribose ring) toward the unusual g^- rotamer (O_5' located away from the 2'-deoxyribose ring) when the phosphorus coordination is increased from P^{IV} into P^V . This conformational transmission effect is operative only when a hydrogen-bond disrupting solvent (DMSO, HMPT) is used. The results provide support to our earlier proposition that conformational changes in natural DNA (e.g., the conversion from right-handed B DNA into left-handed Z DNA) can be initiated by activation of the backbone phosphate groups via a P^{IV} into P^V coordinational transition.

- (1) L.H. Koole, M.H.P. van Genderen, H.M. Buck, J. Org. Chem. 53, 5266 (1988).